

UNIVERSITY OF HONG KONG
FACULTY OF DENTISTRY

PROGRAMME & ABSTRACTS

ANNUAL SCIENTIFIC MEETING 1989
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UNIVERSITY OF HONG KONG --
FACULTY OF DENTISTRY

ANNUAL SCIENTIFIC MEETING 1989

Programme

8:30 - 8:35	Official opening of the Faculty Annual Scientific Meeting
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12:00 - 13:00	Discussion of posters
13:00 - 14:00	Lunch
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15:30 - 16:00	Professor S.H.Y. Wei, Dr. H.P. Philipsen and Dr. E. Theilade: Oral Biology Unit
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17:30	Professor H. Tideman: Inaugural Lecture at Main Campus.]

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10:45 - 11:00	P.T. Kiewiet, P.L. Lim and E. Theilade: Production and Characterization of Monoclonal Antibodies to Fusobacterium nucleatum.	7
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Jan. 18, 1989	D.A. Clarke, N.H. Ladizesky and T.W. Chow: The Construction of Upper Dentures Reinforced with High Modulus Fibres.	Note 2
Jan. 18, 1989	T.W. Chow, D.A. Clarke and N.H. Ladizesky: Clinical Aspects of complete Denture Reinforced with Higher Modulus Polyethylene Fibres.	Note 2
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Note 1: Abstract not received

Note 2: Abstracts appeared in Faculty Annual Scientific Meeting 1988, Programme and Abstracts.

1

M.S. COCKE, R. BEDI and D. O'DONNELL, (Faculty of Dentistry, University of Hong Kong).
Orthodontic Practise and Attitudes of Hong Kong University Graduates.

A previous study has investigated the pattern of orthodontic treatments in general dental practice in Hong Kong. Relevant data are needed to plan future teaching and to project dental manpower needs.

This study reports the orthodontic treatments undertaken in general dental practice by the first dental graduates from the University of Hong Kong (HKU) compared to a random sample of Hong Kong general dental practitioners (GDP's) who qualified elsewhere and have been practising longer. The 58 HKU graduates ('85 and '86) and the 66 other GDP's answered a questionnaire by phone. Attitudes of the practitioners to their orthodontic undergraduate training was also evaluated.

Both samples treated only small numbers of patients with removable appliances (less than 5 per cent) and considered the place of removables in general practice to be very limited. For both groups of general practitioners, half the patients needing orthodontic treatment were neither treated nor referred.

In general the HKU graduates considered their orthodontic training adequate for general dental practice but many felt inadequately trained to recognise anchorage loss or to handle head-gear.

2

E.F. Corbet and W.I.R. Davies

An evaluation of undergraduate teaching outcomes in Periodontology.

The undergraduate course in Periodontology at the University of Hong Kong was designed to be relevant to Hong Kong and all the teaching materials have been produced by departmental staff members in pursuance of this aim. To evaluate the outcome of this course in terms of graduates' perceptions of periodontal disease and its management together with their opinions on aspects of the course, a questionnaire was mailed to 255 alumni of the Faculty of Dentistry. This questionnaire was also mailed to 305 registered dentists, who gained their primary qualification outside Hong Kong during 1980-88, whose names were on the 1989 Dental Register maintained by the Dental Council of Hong Kong.

The response from HKU graduates was 64% and from non-HKU graduates was 37%. Of HKU graduates 63% gave their principal style of practice as private and 74% expressed strong confidence in being able to treat most of the periodontal conditions presenting to them in practice. 64% of the HKU graduates felt their undergraduate course to have been practical enough for their practising situations, compared to only 39% of responding non-HKU graduates. In general statements propounding a biological perception of disease behaviour were more strongly agreed with by HKU graduates than by the responding non-HKU graduates. Furthermore 40% of responding non-HKU graduates had no undergraduate teaching in working with hygienists, which is not the case for HKU graduates. Over 37% of responding non-HKU graduates were of the opinion that there had been insufficient attention to root planing in their undergraduate course, compared to only 13% of HKU alumni holding this view; and periodontal surgery was reported to be performed less frequently by the HKU graduates than by these non-HKU graduates. 80% of non-HKU graduates wanted continuing education courses in periodontology with only 60% of HKU graduates expressing the same wish. It was concluded that the HKU course in Periodontology is deemed by a majority of its graduates as an adequate preparation for the provision of periodontal care by them in Hong Kong, and further that differences in the perceptions of HKU graduates and of non-HKU graduates with respect to periodontal disease and its management can be discerned.

3

WEI, SHY* and CHAN JCY (Prince Philip Dental Hospital, University of Hong Kong) Monitoring Fluoride Levels of Drinking Water in Hong Kong.

Drinking water in Hong Kong was fluoridated since 1961. The initial water F level was set at an average of 0.8 ppm and was increased to 1.0 ppm in 1976. Due to increasing signs of dental fluorosis in children born after 1967, the target level was reduced to 0.7 ppm in 1978. A further reduction of the target level to 0.5 ppm was carried out in June, 1988. However, a survey of the F levels in drinking water during the months of October and November 1988 showed that 77.9% of the water samples collected were below 0.4 ppm (Chan, Fei & Wei 1989). The purpose of this study was to continue monitoring the F levels of drinking water in HK. Water samples were collected on two specific days (1/28/1989, 4/22/1989) from selected sites in HK Island, Kowloon and the New Territories. F contents were determined using a combination fluoride electrode. The results were as follows:

Date	No. of Samples	Mean (F) \pm S.D.	Below 0.4 ppm	Distribution 0.4-0.6 ppm	Above 0.6 ppm
Jan 28	74	0.33 \pm 0.07 ppm	91.9%	6.8%	1.3%
Apr 22	69	0.34 \pm 0.13 ppm	73.9%	23.2%	2.9%

There is still a problem of inconsistent and underfeeding of F in the drinking water in Hong Kong and the situation must be rectified so that people may receive the optimal benefits of water fluoridation.

4

CHAN JCY*, WEI SHY, LUI S, LEUNG SSF (Prince Philip Dental Hospital, HKU and Paediatrics, CUHK) Dietary Fluoride Intake of 2-month-old infants in Hong Kong.

Drinking water in Hong Kong was fluoridated at 0.7 ppm between June 1978 and June 1988. In spite of this seemingly appropriate fluoride level, recent surveys have shown a higher than optimal level of enamel fluorosis in children born during this period. The purpose of this study is to determine the dietary F intake of a group of 2-month-old infants in Hong Kong. Detailed dietary histories using a 24 hours recall method were obtained from 153 bottle fed babies at 2 months. These babies were randomly selected from those born between June and December 1984 in Shatin, HK. The F content of foods consumed were determined using a HMDS - microdiffusion method. F intake of each baby was estimated from the dietary data. The mean energy intake of this group of babies was 109 \pm 20 (S.D.) Kcal/Kg/day and the mean body weight was 5.2 \pm 0.6 Kg. The mean total F intake was 0.62 \pm 0.14 mg/day and is equivalent to a mean F intake of 0.12 mg/kg body weight. Our result indicates that the mean total F intake of 2-month-old infants in Hong Kong is very close to the maximum F intake of infants in the USA (0.633 mg) as estimated by Singer and Ophaug (1979). It is also higher than the generally recommended optimum intake of between 0.05 to 0.07 mg of F per Kg body weight.

This study was supported by the Strategic Research Grant, HKU.

Previous studies have shown that various modes of oral hygiene instruction were effective in improving the gingival health of a group of company employees. The purpose of this report was to evaluate the longer term effects of oral hygiene in maintaining gingival health.

117 subjects were given oral hygiene instruction either by a dental hygienist, using a self-educational manual or viewing a video. The participants were examined at baseline, 2 weeks, 4 months, 10 months and 16 months. Only at the 10 months review the participants were given scaling. The clinical parameters used were presence of plaque and bleeding on probing. There was a significant improvement in the plaque and bleeding scores at all the review appointments when compared with baseline. Some participants demonstrated a further reduction in bleeding scores following scaling at 16 months. A clear majority of nearly two thirds of the participants considered oral hygiene instruction to be of more value than the scaling or the clinical examinations. The study appears to indicate that an improvement in gingival health can be achieved through oral hygiene instruction carried out with or without scaling and also that there is patient appreciation of the oral hygiene component of therapy.

C.J. HOLMGREN*, J. THEILADE and K.M. PANG (Faculty of Dentistry, University of Hong Kong): The Removal of Plaque from Calculus by Toothbrushing.

Recent epidemiological evidence suggests that a proportion of periodontal sites with calculus fail to exhibit clinical inflammation as evidenced by absence of bleeding after probing (Holmgren *et al.*, 1986, 1987; Takahashi *et al.*, 1988). It is hypothesised that this phenomenon is due to regular oral hygiene measures achieving a biologically acceptable level of plaque removal from the surface of the calculus. The objective of this study was therefore to determine if the removal of stainable plaque from the surface of calculus could be effected through normal toothbrushing. Nine extracted anterior teeth with visible plaque and calculus were sectioned in half along the longitudinal plane, using a diamond disk, leaving the two halves joined coronally. Prior to brushing the tooth was stained to identify plaque. Control (unbrushed) and test (brushed) sections were separated by a brass shim whereupon the test section was brushed with a soft toothbrush in a manner akin to normal toothbrushing using a circular scrubbing motion. After 10 and 100 strokes, the tooth was restained and examined under a dissection microscope. Photographs were taken at each stage. The results from this study show that in the majority of samples little stainable plaque was retained following brushing the calculus surface both after 10 or 100 strokes. The results of this in-vitro study may to some extent explain why some sites with calculus fail to exhibit bleeding on probing.

7 KIEWIET P.T.*, LIM P.L. and THEIHADE E. (Department of Microbiology and Oral Biology Unit, University of Hong Kong) Production and characterization of monoclonal antibodies to *Fusobacterium nucleatum*.

A number of bacteria have been implicated in the cause of periodontal diseases. One of them is *Fusobacterium nucleatum*, but little is known about its role in it. We attempt to address this question by preparing, in the first instance, a set of molecular probes against this organism.

Murine monoclonal antibodies to *F. nucleatum* (EF9126) were produced by somatic cell fusion using spleen cells obtained from BALB/c mice previously immunized against whole cells of the organism, and the myeloma cell line, NS1. Thirty hybridoma clones were obtained which produced antibodies reactive with a crude extract of the immunizing bacterium in an enzyme-linked immunoassay. Two of the antibodies were specific for the lipopolysaccharide (LPS) of the organism, while the others were directed against non-LPS (presumably protein) determinants. The LPS-specific antibodies also reacted with 5 other strains of *F. nucleatum*, whereas all except 2 of the protein-specific antibodies reacted only with the immunizing strain. The 2 exceptions bound also to 4 of the 5 other strains. These antibodies are being characterized further by Western blot analysis as well as by their staining reactions on whole cells.

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Presented at IADR, SEA Meeting, November, 1989

8 LAU S.K*, Kwan S.Y.L.**, Wei W.I.*, Yew W.W.** (*Department of Surgery, University of Hong Kong, **Tuberculosis & Chest Service of Hong Kong): PROGRESS REPORT ON CERVICAL TUBERCULOUS LYMPHADENOPATHY - PROSPECTIVE STUDY

The aim of this study was to compare the efficacy of a 6 month regimen of chemotherapy with a 9 month one in the treatment of cervical tuberculous lymphadenopathy (TBLN). Ninety-six patients with clinical diagnosis of cervical TBLN had surgery of the lymph nodes. The diagnosis was confirmed histobacteriologically. Sixty-two patients had confirmed TBLN. There were 36 female and 26 male. The mean age was 30 years (range from 13-73).

While all complained of neck swelling, 11 had cough. The size ranged from 0.5 to 5 cm. Fifteen have solitary node. Most of the lymph nodes situated in the posterior triangle. At presentation 15 had abscesses or discharging sinuses. Fine needle aspiration could diagnose 44 (71%) of them. All patients had positive tuberculin reaction. Chest radiography showed tuberculosis in 19. Lymph node specimen showed Mycobacteria tuberculosis in 47 (75%). All except one had histology compatible with mycobacterial infection. Forty-one patients were randomized into either regimen of chemotherapy i.e. (1) 4S3H3R3I3 + 2H3R3 (2) 4S3H3R3I3 + 5H3R3. Twenty-five had completed the course and been followed up for at least 12 months. Both regimens showed good early response in term of reduction of the lymph node size. There were early recurrence of infection after completion of either regimen. Further follow up is necessary to assess the efficacy of the 2 regimens.

9 J.C.C. WANG and M.A. LUNG (Department of Physiology, Faculty of Medicine, University of Hong Kong, Hong Kong): Blood flow and saliva secretion of canine mandibular gland.

In experimental animals, parasympathetic stimulation causes a lively secretion and vasodilatation of salivary glands whereas sympathetic stimulation causes a scanty flow of saliva and vasoconstriction. However, little is known about the relation between blood flow and saliva secretion. The aim of this study was to determine the effects of changes in blood flow on the rate of saliva secretion during parasympathetic stimulation.

In dogs anaesthetized with sodium pentobarbitone (25mg/kg,iv), the mandibular artery was perfused with blood from a femoral artery; blood flow was altered by changing the rate of the perfusion pump. Saliva secretion was measured from the mandibular duct by means of a doppler flow sensor or a 'drop' recorder. The chorda lingual nerve was stimulated for 1min at 5V, pulse duration of 0.5ms and varying frequency. We found that the rate of saliva secretion to low frequency stimulation (2-4Hz) was unaffected by changes in blood flow; however, the response to high frequency stimulation (8-16Hz) was also unaffected by increases in blood flow but reduced by decreases or cessation of blood flow. Hence, the relation between blood flow and saliva secretion depends on the frequency of stimulation in the canine mandibular gland.

Supported by HKU Dental Faculty Research Grant 335/277/0001, HKU CRCG Research Grant 337/034/0011 and Lee Wing Tat Medical Research Fund 377/030/7840.

10 M.A. LUNG and J.C.C. WANG (Department of Physiology, Faculty of Medicine, University of Hong Kong): VIP and parasympathetic saliva secretion and blood flow of mandibular gland.

There is accumulating evidence that non-adrenergic and non-cholinergic neural mechanisms may play a part in the control of blood flow and secretion in salivary glands. The aim of this study was to investigate if vasointestinal peptide (VIP) is involved in the non-cholinergic parasympathetic control of blood flow and secretion of the canine mandibular gland.

In dogs anaesthetized with sodium pentobarbitone (25mg/kg,iv), we measured with electromagnetic and doppler sensors arterial inflow from the mandibular glandular artery and secretion from the mandibular duct. The chorda lingual nerve was stimulated for 1min at 5V, pulse duration of 0.5ms and varying frequency. We found that parasympathetic stimulation increased blood flow and secretion immediately with the magnitude of responses in direct proportion to frequency of stimulation. VIP (ia) infusion caused a gradual increase in blood flow and a much delayed secretion; the blood flow response was dose-dependent but secretion remained scanty with maximal dose. After atropine, pattern of responses to both stimuli remained dissimilar. After an induction of maximal vascular and secretory responses to VIP, parasympathetic stimulation caused a reduction in blood flow and copious secretion. Hence, it seems that VIP is not involved in the non-cholinergic parasympathetic control of blood flow and secretion of mandibular gland in the dog.

Supported by HKU Dental Faculty Research Grant 335/277/0001, HKU CRCG Research Grant 337/034/0011 & Lee Wing Tat Medical Research Fund 377/030/7840.

11 W.Z. WANG¹, M.M.P. YANG² AND J.S.L. KWOK² (¹Stomatology, Nanjing Medical College, China, ²Physiology, University of Hong Kong): The IgG levels in Gingival Fluid in Relation to the Severity and the Treatment of Periodontitis

There were few reports concerning the measurement of IgG levels in relation to the severity and treatment of periodontitis. We have used the radial immunodiffusion method to examine the total amount and the concentration of gingival crevicular fluid (GCF) which is collected by microcapillary pipettes.

Preliminary result showed that the degree and severity of periodontitis were closely related to the degree of GCF volumes and the IgG levels. Thus, the more severe the inflammation, the higher was the GCF volume and the IgG total amount, as well as the concentrations, and vice versa. Three to seven days after treatment with root planning and scaling in the patients with different degree of gingival inflammation the GCF volume and IgG total amount and the concentration were significantly decreased. The change of serum IgG levels is not always parallel to the changes of IgG levels in GCF in response to the local treatment. The scores of plaque index (PI) and gingival index (GI) were averaged above 2 before treatment and reduced to 0.5 after treatment. The ratio of motile rods and spirochetes were markedly altered after treatment.

This study was supported by grants from CRCG and Lee Wing Tat Medical Research Fund, University of Hong Kong.

12 MABEL M.P. YANG¹, K.W. NG², H.L. ZENG³ AND J.S.L. KWOK¹ (¹Physiology, University of Hong Kong, ²Adelaide University, Australia, ³Stomatology, Nanjing Medical College, China): Effect of Acupuncture on Immunoglobulins of Serum, Saliva and Gingival Crevicular Fluid.

The present research is a preliminary investigation on the changes of immunoglobulins in serum, saliva and gingival crevicular fluid in response to acute and chronic acupuncture stimulation in 70 volunteers.

Radial immunodiffusion method was used for measuring IgG & IgA levels. Saliva was collected with or without concentration. Gingival crevicular fluid of central incisor teeth was collected with round filter paper (1.5 mm in diameter, 3 mm) which was then placed in the wells of agar gel containing antibodies. The acute acupuncture effect showed that 30 min and 2 hr after treatment saliva IgA levels were significantly increased in those who had previous low levels, but decreased in those who had previous high levels. When acupuncture was given daily for 2 weeks, the saliva IgA level was significantly increased. The IgG levels in serum and gingival crevicular fluid were also significantly increased after chronic acupuncture stimulation daily for 7-10 days. The regulatory effect of acupuncture on the immunological function of body defense system is discussed.

This study was supported by grants from CRCG and Lee Wing Tat Medical Research Fund, University of Hong Kong.

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J.P. FOWLER, S.K. TONG, S.A. BOBAK, P.Y. CHENG, A. ASUNDI*,
(Depts. of Anatomy & *Mechanical Engineering): Cross-Sectional
Anatomy Of The Leg In Relation To Acupuncture Points.

Further to our report in a poster last year on various biomechanically significant findings in a cross-sectional study in relation to acupuncture points in the human leg (n=4), we have continued this line of investigation in the same specimens and now report significant differences between the proximal (4-7) and distal (8-12) cun (division) segments. The number of points per cun, the mean stress and relative stress in (muscle + tendon) and (bone excluding cavity) are all significantly different in the 2 segments. These findings further support the hypothesis of the biomechanical significance of acupuncture points.

Further investigation continues in order to try and identify why points occur in various muscles at different levels.

14

E.KAM, J.MIDDLETON, J-J XIAO, C.TIPOE, E.B.LANE* and F.H.WHITE* (Dept. of Anatomy, HKU and Imperial Cancer Research Fund Laboratories*, UK): The Distribution of Cytokeratin Monoclonal Antibodies L1001, LP34 and RKSE60 in Nasal mucosa, Salivary Glands, Sebaceous Glands and Odontogenic Epithelium.

In secretory epithelia, cytokeratin intermediate filaments are present as a supporting structural framework to help maintain cellular form. Antibodies directed against these filaments are now being used to classify epithelia and the distribution patterns of cytokeratins revealed by immunohistochemistry have significant diagnostic potential. In this preliminary report we evaluate the distribution of cytokeratin monoclonal antibodies L1001, LP34 and RKSE60 in glandular and odontogenic tissues as a prelude to further studies which will investigate pathological alterations in these tissues. Hamster heads were fixed in Bouin's solution and after decalcification were bisected and processed for light microscopy. Immunoperoxidase techniques were used to stain sections with the three monoclonal antibodies. Antigen binding with the respective antibodies was examined. Salivary acini and ducts did not show a positive reaction with any of the antibodies. Ameloblasts, during all stages of their development in the continuously erupting hamster incisor, demonstrated a weakly positive reaction with L1001 but were negative for LP34 and RKSE60. Sebaceous glands were weakly positive with L1001 but negative with LP34 and RKSE60. The nasal mucosa was found to be negative with L1001 and RKSE60 but showed some patchy staining of the basal layer with LP34. The patterns detected provide us with some useful preliminary data defining baseline reactivities. Further immunohistochemical assessments using different cytokeratin antibodies are in progress to enable us to define more precisely cytokeratin distribution in secretory and ductal epithelia of the oral region and to use these data for comparative studies with salivary gland and odontogenic lesions. This study is supported by Sun Run Shaw Research & Teaching Endowment Fund 372.162.6364.

Epithelia contain structural proteins, cytokeratin intermediate filaments, which are responsible for the maintenance of cellular form and, in keratinising epithelia, contribute to the protective fibrous outer keratin layer. Cytokeratins of different molecular weights have been isolated and antibodies which have been raised against them can be used to determine alterations in the pathways of epithelial differentiation. Hamster heads, fixed in Bouin's solution, were decalcified, processed for light microscopy and sectioned. Using an immunoperoxidase technique, they were then stained with monoclonal antibodies directed against cytokeratins of different molecular weights: LLO01 (MW 50,000), LP34 (MW 45-58,000) and RKSE60 (MW 56,000). Epithelia from the gingiva, dorsal and ventral surfaces of the tongue, floor of the mouth, hard and soft palates, inter-follicular epidermis and lip were examined for staining patterns with these antibodies. The distribution of the reaction products was varied. LLO01 reacted most strongly with basal cells in all sites. In dorsal tongue, the staining was intense in those basal cells lying above the tips of the connective tissue papillae. Antibodies LP34 and RKSE60 stained suprabasal components but with varying intensities. Immunohistochemistry of cytokeratins is an important adjunct to descriptive studies and attempts will be made to combine morphometry with immunohistochemistry in order to study unusual and abnormal differentiation. This study is supported by Run Run Shaw Research & Teaching Endowment Fund 372.162.6364.

The continuously erupting rat incisor provides an excellent model for the study of the ameloblast lifespan. Under anaesthesia, intracardiac perfusion with Karnovsky's fixative was performed followed by decapitation and decalcification. The jaws were dissected and the anterior segments with incisors were removed. Each tooth was divided into four or five transverse segments and processed for electron microscopy. Sections were cut from areas corresponding to presecretory, secretory, maturation and involution zones. Fully differentiated presecretory ameloblasts were columnar with basally located nuclei and mitochondria. RER profiles and lysosomes were prominent in the apical cytoplasm. The apical plasma membrane adjacent to the mineralising dentine matrix showed evidence of short narrow invaginations and the presence of exocytotic vesicles. Secretory ameloblasts were longer with more RER and occasional lipid inclusions. Tomes' processes were usually present adjacent to the fibrillar enamel matrix. In the maturation zone, ameloblasts were shorter with a less amount of RER, an increase in the number of lysosomes and a random distribution of ribosomes. The apical plasma membrane contained numerous closely packed deep clefts and abutted onto an enamel matrix-free zone. Involuting ameloblasts were relatively short, with reduced amounts of RER, randomly distributed mitochondria, more centrally located nuclei and prominent cytokeratin intermediate filament bundles. The establishment of clearly definable morphological zones of ameloblasts which characterise the different functional stages of their lifespans, is thus possible. Our future studies will evaluate the nature of these cytological alterations using an integrated morphometric and immunocytochemical approach. This study is supported by Faculty of Dentistry Research Grant Award 335.270.0005.

17

P. Cheng⁺, K.H. Pang⁺, T.R.C. Boyde⁺, F.H. White⁺, J. Theilade[#],
(Dept. of Anatomy⁺, Dept. of Biochemistry⁺, Oral Biology Unit⁺, Dept. of
Periodontology & Public Health[#]): Fine Structure of the Odontogenic
Tissue Prior to Mineralization

The continuously growing rat incisor is commonly used for studies of mineralization because of the orderly fashion in which the hard dental tissues are formed. To gain detailed knowledge of the mechanisms involved in the initial mineralization processes, this study is designed to provide the ultrastructural baseline of the inner dental epithelium (IDE) and the ectomesenchymal cells of the dental papilla. Five mandibles from foetal rats (19 d embryonic life) were processed for electron microscopy. The IDE appears as a single layer of columnar cells along the basal lamina, which separates them from a narrow cell-free zone and then the ectomesenchymal cells of the dental papilla. The IDE nuclei are basally located with prominent nucleoli. Mitochondria are evenly distributed and free ribosomes abound. The apical cytoplasmic membrane runs parallel to the adjacent basal lamina. Adjacent to the basal end of the IDC cells is the stratum intermedium (SI), which is several cells in thickness, aligned perpendicular to the IDE cells. The SI cell is dominated by a large nucleus, with a narrow rim of cytoplasm containing free ribosomes and a few mitochondria. The cytology of the IDE and SI cells is therefore not typical of the massively increased synthetic activity which occurs during the next 24 h. Thus the 19 d embryonic stage serves well as baseline for the subsequent studies of initial mineralization. (This study was supported by the Run Run Shaw Fund, 372/162/6368, the CRCG 337/032/0003, Dental Faculty Research Grant 335/270/0005 and the UFGC Research Subcommittee 338/032/0001.)

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L.S.M. TONG⁺, H.M. KING, M.K.N. PANG⁺ and S.H.Y. WEI (Dept. of
Children's Dentistry & Orthodontics, ⁺Oral Biology Unit, Faculty
of Dentistry, HKU.): The Effect of Bleaching on the Surface Enamel.

Two commonly performed bleaching techniques for discoloured teeth use 30% H₂O₂ in conjunction with a bleaching light after etching with 37% H₃PO₄, and HCl with pumice. Data on the effects of these bleaching agents and abrasives on the surface structure of enamel are limited. The aims of this study were to investigate the *in vitro* effects of these bleaching agents and abrasives individually, and in combination on surface enamel. The buccal surfaces of the incisal and cervical one-thirds of vertically hemisected teeth were covered with varnish to protect the enamel against the test reagents; thus these areas served as controls. Replicas of the surfaces after bleaching were prepared and studied using SEM. The depth of enamel loss was measured using direct and polarized light microscopy, and contact microradiography.

Enamel loss in the H₃PO₄ etched sections ranged from 2.4-7.3 μm; in the etched and H₂O₂ treated sections, it ranged from 4.8-6.05 μm; and for HCl-pumice abraded sections, it ranged from 285-390 μm. SEM study of the cut surface of the embedded sections confirmed permanent loss of enamel. Etching only and etching plus H₂O₂ bleaching showed typical Type II etching patterns. The main reason for enamel loss when bleaching a tooth with H₂O₂ is the etching procedure which is carried out prior to bleaching to facilitate the penetration of H₂O₂. The enamel loss in the HCl treated teeth was markedly greater than H₂O₂ bleached teeth. The changes in the surface morphology of the enamel may make treated teeth more susceptible to staining and caries. (Supported by RCUK grant no.335.251.0015.)

19

D.K. BROWN and T.K.L. LI (Oral Radiology Unit, P.P.D.H.):
Scattered Radiation from Intra-oral Radiography - Hazardous or
Safe for Operators?

Surveys have consistently indicated that while scattered radiation levels from intra-oral radiography are directionally variable, dosage levels using modern X-ray apparatus are well within permissible limits. The purpose of this present study was to demonstrate that intra-oral radiographic procedures in the P.P.D.H. posed no unacceptable hazard to operators or other staff.

Intra-oral film packets were positioned at various points on and around the chair in an X-ray examination room. Mixed intra-oral X-ray examinations were carried out normally and films were removed and processed at intervals over a five and a half week period. The resulting photographic densities were compared with densities produced on similar films with known, calibrated exposures. While at 1 metre lateral to the source of scatter the exposure was only approximately 10% of the permissible level, at the recommended minimum operator distance of 2 metres from the source of scatter the exposure was less than 1.5% of the permissible occupational level.

As this exposure rate would produce a total annual exposure of probably less than half the average Hong Kong population background exposure, and as this total annual exposure is divided among several individuals, any occupational radiation hazard to individual operators in P.P.D.H. may be considered minimal.

20

D.A. Clarke*, N.H. Ladizesky†, T.W. Chow‡: A Laboratory Technique for
Producing Complete Denture Bases Reinforced with Highly Drawn Linear
Polyethylene Fibres
*Dental Technology Unit, †Dental Materials Science Unit, ‡Department of
Prosthetic Dentistry, Faculty of Dentistry, University of Hong Kong

Different aspects of a project on the fibre reinforcement of denture base resins have been presented in previous talks. This poster continues the series with a sequence of photographs outlining the stages for the production of a clear acrylic permanent upper base with optimum positioning of a woven polyethylene fibre insert.

It is important to ensure complete penetration of the reinforcing weave by the resin. It will be shown that this requirement has been fulfilled with the developed production technique.

In addition, a table is presented showing the mechanical properties of unreinforced and reinforced acrylic resins. These were determined in the laboratory using bars of rectangular cross-section. The results show that significantly better properties are obtained with the reinforced samples, and these improvements could also be anticipated for reinforced prostheses.

This poster was presented at the 21st Annual Conference of the Society of University Dental Instructors, Bristol, U.K.: 30th March - 1st April, 1989.

The research is supported by CRCG Grant No. 335.263.0003.

21

WEI W.I., Lau W.F. (Department of Surgery, University of Hong Kong, Queen Mary Hospital): COMPOSITE MICROVASCULAR FREE TISSUE TRANSFER FOR MAXILLOFACIAL RECONSTRUCTION

Defects in the maxillofacial region following tumour resection can usually be reconstructed with a prosthesis or pedicle flaps. There are, however, occasions when these modalities are not available or not suitable and free composite tissue transfer with microvascular anastomosis is the only solution.

From 1984 to 1988 in the Department of Surgery, Queen Mary Hospital, University of Hong Kong we have performed free tissue transfer in 11 patients. Five of them were used for mandibular defects and 6 for reconstruction of soft tissue loss of the maxillofacial region. In 10 patients there was complete success of transfer with no instance of tissue necrosis. In one patient the flap was lost due to venous congestion.

Free composite microvascular free tissue transfer is useful when other methods of reconstruction are not suitable.

22

L K CHEUNG* (Department of Oral Surgery & Oral Medicine, University of Hong Kong): The Microvascular Anatomy of Sternocleidomastoid Muscle - A Progress Report

The sternocleidomastoid muscle (SCMM) with its overlying skin island and attached segment of clavicle serve as versatile reconstructive materials following ablative oral surgery. However, about 50% of these flaps were reported failed due mainly to tissue ischaemia. The gross arterial supply to the above tissues is largely known, but the microvasculature remains unexplored. In order to improve the reconstruction outcome, this project is designed to study the microvasculature subserving the above tissues.

The vascular supply to either side of the neck of 15 fresh cadavers are infused via the common carotid and subclavian artery using Indian ink, lead oxide, and methacrylate resin respectively. The SCMM with its overlying skin and clavicular periosteum are then harvested or digested with corrosives to be examined by stereo-microscopy, radiography and scanning electron microscopy. The 3-dimensional pattern and calibre of vessels are noted, with special emphasis on valvular orientation and adequacy of venous drainage. This study describes a novel method to elucidate the latter and progress has so far been satisfactory. It is hoped that the findings will contribute to the understanding of the vascular factors necessary for a successful SCMM myocutaneous flap.

This study is supported by HKU research grant 335/253/0009.

23

L K CHEUNG* and M R C RODRIGO (Department of Oral Surgery and Oral Medicine, University of Hong Kong): Tenoxicam for pain relief following third molar surgery

Tenoxicam is a new long acting non-steroidal anti-inflammatory agent with promising action on pain control of musculoskeletal origin. This study compares the efficacy of tenoxicam with paracetamol in pain relief following third molar surgery.

30 Chinese patients with bilateral symmetrical impacted lower third molars were selected in a double blind cross-over study. Either tenoxicam 40mg or paracetamol 1000mg was administered immediately prior to surgery of one side and the alternative for the other side respectively. The severity of pain was recorded on visual analogue scales for 10 consecutive post-operative hours. The scores of both groups were compared at each hour. There was no statistical difference between the groups. Tenoxicam did not maintain significant longer period of pain relief than paracetamol. More than 50% of patients in either group did not take further analgesic following a single pre-operative dose.

This study shows that both paracetamol and tenoxicam are efficient as pain relievers after third molar surgery. Tenoxicam has comparable efficacy as paracetamol, but it does not provide extra advantage in terms of duration of action. The discrepancy between the clinical observation and pharmacokinetic prediction may be related to the strong serum protein binding property of tenoxicam.

24

N.H. Ladizesky*, M.K.M. Pang†, D.A. Clarke‡: Integration of Acrylic Resin with Polyethylene Fibre in Reinforced Dentures (Progress Report)
*DMS Unit, †Oral Biology Unit, ‡DTU Unit, Faculty of Dentistry, University of Hong Kong

Various aspects of a research project on the fibre reinforcement of denture base materials have been presented in earlier seminars, including clinical trials of upper dentures. The work has now been extended to lower dentures, in parallel with a 3-fold increase in the fibre content of all reinforced prostheses.

For best properties the resin should penetrate the array of reinforcing fibres. These aspects are being studied with optical and electron microscopy, and the results indicate that satisfactory fibre/resin integration is obtained with the method developed for the manufacture of reinforced dentures.

The research is supported by CRCG Grant No. 335.263.0003.

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T.W. Chow*, N.H. Ladizesky+: Water Sorption of Polyethylene Fibre Reinforced Dental Resins (Progress Report)
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The study is part of an on-going project investigating the mechanical properties of polyethylene fibre reinforced dental resins and their clinical applications. The purpose of the experiment is to investigate the effect of fibre reinforcement on the water sorption of denture base resins.

The procedures broadly follow recommendations of American Dental Association specification no. 12 and International Standard (ISO) 1567-1978(E). The main modification involves an extended period of immersion to approach saturation, giving a closer analogy to clinical situations.

Measurements were made at appropriate intervals over a period of 80 days. The composite systems are found to have similar patterns of water uptake as normal poly(methylmethacrylate) but significantly lower values due to the hydrophobic property of the fibres. Potentially this could improve the problem of warpage of denture bases.

The experiment also reveals some interesting findings of the effect of polishing on fibre-resin integration.

This research is supported by Faculty Research Grant no. 335.255.0004 and 335.263.0003.

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Validity of compressive and indirect tensile strength
B.W. Darvell, Dental Materials Science

Diametral compression of cylindrical specimens is commonly used in studies of the strengths of dental materials as it is in many other areas, notably that of concrete. This test design is based on a theoretical analysis due to Hertz (1885) which predicts a nearly uniform tensile stress over a large portion of the diametral plane. The analysis ignores shear stresses, the distribution of which shows very strong peaks near the load lines. Reported experimental evidence fails to confirm the expected tensile failure in this and many similar test designs. Tests now on dental stone show an unexpected, strong dependence of apparent strength on the width of the loading area. This result cannot be explained by any standard theory. Indirect tensile strength is therefore invalid. A further result of theoretical considerations is that all uniaxial compression tests give similar stress distributions and the failure mode is thus similar. In particular, the standard test for compressive strength, that is, using a cylinder loaded on the ends, is included. This, too, cannot be interpreted by standard theories. There is no such thing as compressive strength.

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